Claims

We claim:

1. A method for aligning a wafer, comprising:

providing a wafer having alignment marks formed thereon;

radiating a first light beam onto the alignment marks so as to generate a first diffracted light beam;

sensing the first diffracted light beam at a first position;

radiating a second light beam onto the alignment marks so as to generate a second diffracted light beam;

sensing the second diffracted light beam at a second position;

calculating a correction value for aligning the wafer based on a first difference between the first position and a first predetermined position and a second difference between the second position and a second predetermined position; and

aligning the wafer based on the correction value.

2. The method of Claim 1, wherein radiating the first light beam comprises vertically radiating the first light beam onto the wafer.

3. The method of Claim 1, wherein radiating the second light beam comprises radiating the second light beam at an incident angle of about 0° to about 90° with respect to the wafer.

4. The method of Claim 1, wherein calculating the correction value comprises:

determining first and second scaling factors;

multiplying the first difference by the first scaling factor to generate a first product;

multiplying the second difference by the second scaling factor to generate a second product; and

adding the first and second products.

5. The method of Claim 4, wherein determining the first and second scaling factors comprises:

calculating respective values for the first and second scaling factors such that adding the first and second products results in a value of zero when the alignment marks are substantially the same height.

6. The method of Claim 1, wherein radiating the first light beam comprises:

moving the first light beam along the alignment marks.

7. The method of Claim 7, wherein radiating the second light beam comprises:

moving the second light beam along the alignment marks in a same direction that the first light beam is moved along the alignment marks.

8. The method of Claim 1, wherein the first light beam comprises at least one of an He-Ne, Ar, KrF, ArF, F_2, and X-ray light beam.

9. The method of Claim 1, wherein the second light beam comprises at least one of an He-Ne, Ar, KrF, ArF, F_2, and X-ray light beam.

10. An apparatus for aligning a wafer, comprising:

a stage that is configured to hold a wafer with alignment marks;

a light source component that is configured to radiate a first light beam onto the alignment marks so as to generate a first diffracted light beam and to radiate a second light beam onto the alignment marks so as to generate a second diffracted light beam;

a first sensing component that is configured to sense the first diffracted light beam at a first position;

a second sensing component that is configured to sense the second diffracted light beam at a second position; and

a position correcting component that is configured to calculate a correction value for aligning the wafer based on a first difference between the first position and a first predetermined position and a second difference between the second position and a second predetermined position.

11. The apparatus of Claim 10, wherein the light source component is configured to vertically radiate the first light beam.

12. The apparatus of Claim 10, wherein the light source component is configured to radiate the second light beam at an incident angle of about 0° to about 90° with respect to the wafer.

13. The apparatus of Claim 10, wherein the light source component comprises:

a light source that is configured to generate a light beam; and

a beam splitter that is configured to generate the first and second light beams responsive to the light beam.

14. The apparatus of Claim 10, wherein the light source and the beam splitter are connected to a conveying component, which is operable to move the light source and the beam splitter parallel to the wafer.

15. The apparatus of Claim 10, wherein the light source component comprises:

a first light source that is configured to generate the first light beam; and

a second light source that is configured to generate the second light beam.

16. The apparatus of Claim 15, wherein the first light source and the second light source are connected to a conveying component, which is operable to move the first and second light sources parallel to the wafer.

17. The apparatus of Claim 10, wherein the position correcting component comprises:

a memory that is configured to store the first and second predetermined positions;

a displacement difference calculating component that is configured to calculate the first difference and the second difference; and

a correction value calculating component that is configured to determine first and second scaling factors, multiply the first difference by the first scaling factor to generate a first product; multiply the second difference by the second scaling factor to generate a second product, and add the first and second products.

18. The apparatus of Claim 10, wherein the first light beam comprises at least one of an He-Ne, Ar, KrF, ArF, F_2, and X-ray light beam.

19. The apparatus of Claim 10, wherein the second light beam comprises at least one of an He-Ne, Ar, KrF, ArF, F_2, and X-ray light beam.

20. The apparatus of Claim 10, wherein the first sensing component comprises:

a sensor that is configured to sense the first diffracted light beam at the first position;

a photoelectric device that is configured to photoelectrically convert the first diffracted light beam sensed by the sensor to an electrical signal;

a calculating component that is configured to calculate the first position responsive to the electrical signal.

21. The apparatus of Claim 10, wherein the second sensing component comprises:

a sensor that is configured to sense the second diffracted light beam at the second position;

a photoelectric device that is configured to photoelectrically convert the second diffracted light beam sensed by the sensor to an electrical signal;

a calculating component that is configured to calculate the second position responsive to the electrical signal.